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Comprehensive Study on Occlusal Morphology in Full Mouth Rehabilitation

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ABSTRACT

Full mouth rehabilitation always claims careful attention and meticulous treatment planning. It becomes more challenging with the partial edentulism where bilateral segment is found missing. Successful restoration can be done with plenty of contemporary and conventional treatment planning. Restoration of occlusion in patients with seriously worn dentition is what is going on as each case is novel in itself. There is extraordinary fear engaged with reproducing crippled dentition because of broadly dissimilar perspectives concerning the decision of a fitting occlusal scheme for effective full mouth rehabilitation. This article is an outline of the different occlusal morphology in full mouth rehabilitation which will assist the clinician with choosing a proper occlusal conspire for a singular case.

Keywords: Full mouth Rehabilitation, Implant Retained Denture, Vertical Dimensions (VD), Occlusal.

INTRODUCTION

A beautiful smile always gives pleasure. Crooked, discolored and missing teeth negate the good looks of an individual. The advancements in dentistry have made it possible to enhance the face value by improving the teeth through restorative and cosmetic treatment. Both function and health can be restored to badly deteriorated, diseased mouths by utilizing modern techniques of oral rehabilitation. Recent advances in dental technology, materials and equipment however, have simplified the task of rebuilding, restoring, and rehabilitating diseased mouths. This has enabled dentists to preserve many teeth which would have been sacrificed. Achieving success in full mouth rehabilitation requires a multidisciplinary approach. The ultimate goal of any dental treatment is to provide optimum oral health.

The word rehabilitate implies 'To restore to good condition or to restore to former privilege'. The term 'full mouth rehabilitation' is used to indicate extensive and intensive restorative procedures in which the occlusal plane is modified in many aspects in order to accomplish "equilibration". The modification of plane is characterized by full coverage, multiple crowns, multiple splinting of teeth, modification of arch form by labial or lingual positioning of crowns and various procedures for ' repositioning' the mandible. It implies the restoration of impaired occlusion, enhancement of esthetics, preservation of the remaining teeth and maintenance of a healthy periodontium.

Treatment plan must result in healthy maintainability of the teeth and their respective supporting structures in harmony with the muscles, bones, joints and ligaments of the mouth and jaws. All current experimentation and research in various branches of dentistry is inspired by a common purpose that is to develop the most effective program of oral health service for curing as well as preventing disease. However, the road leading to this is long and thorny, filled with a history of trial, error and adjustments. Many investigators and clinicians have developed procedures based on multitude of theoretic considerations. The final judge in the validity of some of these theories is the clinical experience3. Full mouth rehabilitation entails the performance of all the procedures necessary to produce a healthy, esthetic, well functioning, self-maintaining masticatory mechanism.

DETERMINANTS OF OCCLUSAL MORPHOLOGY

Occlusal anatomy of teeth functions in harmony with structures controlling the movement patterns of the mandible. Structures that control the mandibular movement are divided into two types: those that influence the movement of posterior portion of mandible and those that influence the movement of anterior portion of mandible.

The TMJs are considered as the posterior controlling factors and the anterior teeth are the anterior controlling factors. The posterior teeth are positioned between the two controlling factors and thus can be affected by both to varying degrees.

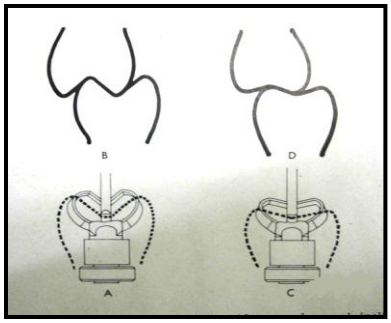

Fig 1: Relationship between incisal guidance and cuspal inclination

Posterior controlling factor

The steeper the articular eminence, the steeper path will the condyles follow during protrusion. It is a fixed factor.

Anterior controlling factor

The steeper the lingual surfaces of the maxillary anterior teeth, the steeper and more vertical will be the movement of the mandible. It is a variable factor and can be altered by the dental procedures.

VERTICAL DETERMINANTS OF OCCLUSAL MORPHOLOGY

These factors influence the height of cusps and depths of fossae

1) Anterior Guidance
2) Condylar Guidance
3) Distance of cusps from these controlling factors
4) Plane of occlusion
5) Curve of Spee
6) Bennett movement :- a) Amount
   b) Direction
   c) Timing

Effect of Anterior Guidance

An increase in vertical overlap produces an increase in anterior guidance angle, more vertical component of mandibular movement and steeper the posterior cusps.

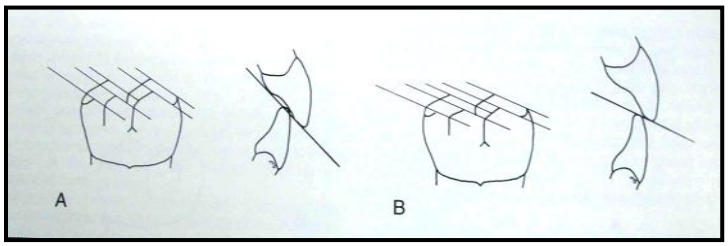

Fig. 2: (a) Pronounced anterior vertical overlap permits longer posterior cusps &
(b) Minimum anterior vertical overlap requires shorter cusps

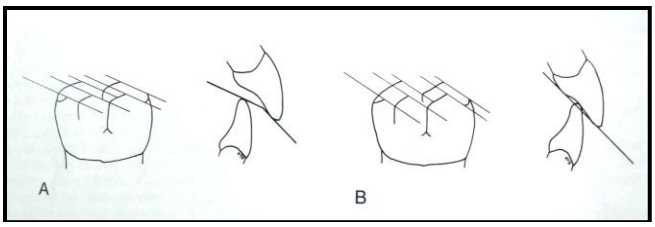

Fig 3: (a) Pronounced anterior horizontal overlap requires shorter posterior cusps &

(b) Minimum anterior horizontal overlap permits longer posterior cusps

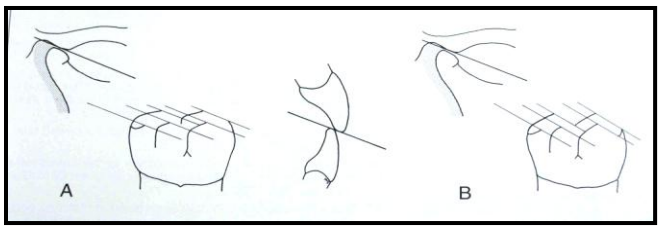

Fig 4: (a) Minimum anterior guidance requires shallow posterior cusps &

(b) Increased anterior guidance permit longer posterior cusps

The steeper the eminence, the more inferiorly the condyle will move during protrusion and steeper will be the posterior cusps.

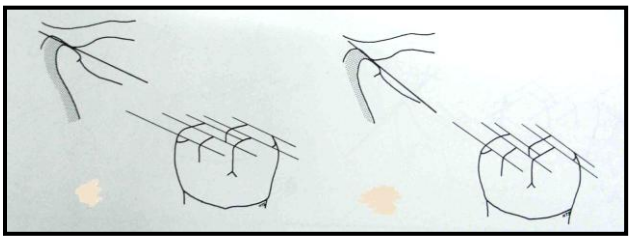

Fig 5: (a) Shallow condylar guidance requires shorter cusps
& (b) Steeper condylar paths permit longer cusps

Distance of Cusps From Controlling Factors

The nearer the tooth to the TMJ, the more the joint anatomy will influence the movement of mandible and occlusal anatomy of teeth.

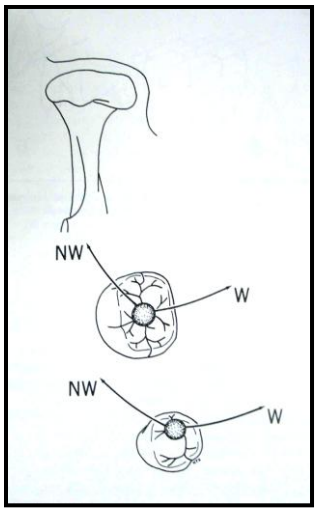

Fig 6: Angle between working (W) ans non-working (NW) paths is greater on teeth

1) Effect of plane of occlusion

This plane touches the incisal edges of maxillary anterior teeth and cusps of maxillary posterior teeth. As the plane of occlusion becomes more parallel to the condylar angle, the posterior cusps must be made flatter.

2) Effect of curve of Spee

The longer the radius of curve of Spee, the flatter will be the plane of occlusion. So greater will be the angle at which the mandibular posterior teeth move away from the maxillary posterior teeth causing easy disclusion of teeth and so the cusps can be made taller.

3) Effect of Bennett movement

a) Amount of movement

During lateral excursion the orbiting condyle moves downward, forward and inward in the mandibular fossa.

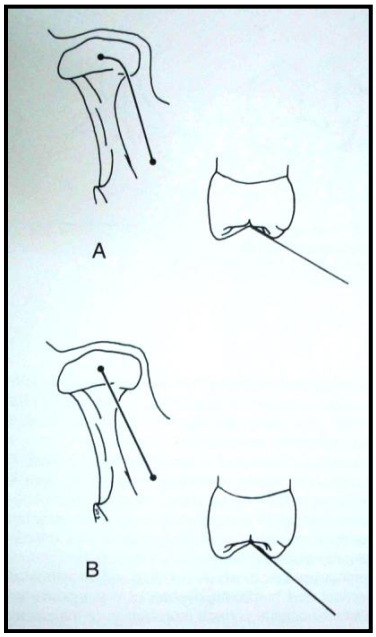

Fig 7: (a) Pronounced immediate lateral translation requires shorter cusps
& (b) Gradual lateral translation allows longer cusps

The degree of inward movement of the orbiting condyle is determined by-

i) Morphology of medial wall of mandibular fossa

ii) Horizontal portion of the TMJ ligament

The looser the TMJ ligament and the greater the departure of the medial wall of fossa from orbiting condyle, the greater will be the amount of mandibular bodily movement. As the Bennett movement increases, the bodily shift of the mandible dictates that the posterior cusps be shorter to permit mandibular shift without creating contact between the posterior teeth.

b) Direction

The rotating condyle can move laterally, superiorly, inferiorly and posteriorly. Laterosuperior movement of working condyle will require shorter posterior cusps than with straight lateral movement. Lateroinferior movement will permit longer posterior cusps than with a straight lateral movement.

Timing

It has the greatest influence on occlusal morlhology. The early shift seen before the condyle begins to translate from fossa is called immediate side shift. When shift occurs with an eccentric movement, it is called progressive side shift. The more the immediate side shift, shorter will be the posterior teeth.

HORIZONTAL DETERMINANTS OF OCCLUSAL MORPHOLOGY

It includes the relationship that influences the direction of ridges and grooves on the occlusal surface. Since the cusps pass between the ridges over grooves, the horizontal determinants also influence the placement of cusps.

Ridge and groove direction has the influence of the following factors –

1) Distance of tooth from axis of rotation
2) Distance from mid-sagittal plane
3) Bennett movement
4) Intercondylar distance

1) Distance of tooth from axis of rotation

Greater the distance of tooth from axis of rotation of the working condyle, wider will be the angle formed by laterotrusive and mediotrusive pathway.

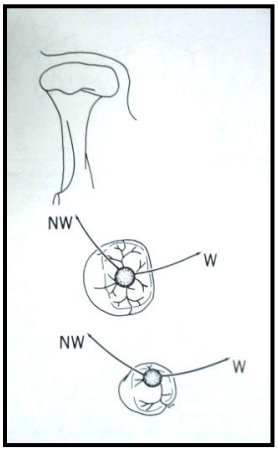

Fig 8: Greater the distance of tooth from axis of rotation of the working condyle, wider will be the angle formed by laterotrusive and mediotrusive pathway.

2) Distance from mid-sagittal plane

As the tooth is positioned farther from the mid-sagittal plane, the angle formed by the laterotrusive and mediotrusive pathways will increase. As the distance from rotating condyle increases, its distance from mid-sagittal plane decreases.

1) Bennett movement

As the Bennett movement increases, the angle formed by the laterotrusive and mediotrusive pathways created by centric cusp tips increases. Thus it influences the direction of cusps and ridges.

2) Intercondylar distance

As the intercondylar distance increases, the distance between the condyle and tooth in the given arch form increases. This tends to cause wider angle between laterotrusive and mediotrusive pathways. As the intercondylar distance decreases, a tooth is placed near the mid-sagittal plane at a distance which tends to decrease the angle generated. Thus the cusps need to be smaller.

Anterior controlling factors and posterior controlling factors are independent of each other. Yet they function together in dictating mandibular movements.

Fixed Anatomic Determinants of Occlusion

1) Anatomy of glenoid fossa
2) Pathways which condyles follow
3) Geometric and functional interplay between the fossa during movement
4) Intercondylar width

5) Radial distance of tooth from condylar rotational centres
6) Distance of tooth from midsagittal plane

Changeable Anatomic Determinants

1) Cusp position
2) Cusp height and fossa depth
3) Ridge and groove position
4) Horizontal and vertical overlaps of anterior teeth
5) Occlusal table width
6) Position of teeth in the arches
7) Vertical dimension
8) Interocclusal space
9) Occlusal plane
10) Curve of Spee
11) Curve of Wilson

Selection of Occlusal Scheme

Occlusal scheme refers to overall plan for restoring the dentition.

Occlusal morphology refers to cusp height, cusp position, fossa position etc.

The different occlusal schemes to be given to a patient requiring full mouth rehabilitation are

POSTERIOR RESTORATION

Fixed or tooth supported removable

Patient presents with	Occlusal scheme
Natural canine protected occlusion	Canine protected
Natural group function	Group function
Canine missing or periodontally weak	Group function
Opposing complete denture	Balanced or monoplane occlusion

Removable – distal extension

Patient presents with	Occlusal scheme
Natural canine protected	Canine protected
Natural group function	Group function
Canine missing or periodontally weak	Group function
Opposing complete denture	Balanced or monoplane
Where no posterior tooth remaining	Canine protected

CONCLUSION

Failure in full mouth rehabilitation case may be dependent on technical and biophysical factors. Technical failures may be loss of restorations and retainers or fracture of metal or porcelain components. Caries, fracture of abutments, periodontal disease and extractions are classified as biological failures.

Health of periodontium is influenced by the oral hygiene practice of the patient, crown position and margin, contour and occlusion of the restoration. Hygiene instructions combined with repeated prophylaxis every six months prove successful in maintaining oral health. Adequate plaque control program to prevent secondary caries is essential.

Provided the recall schedules and oral hygiene maintenance is properly done and restorations are meticulously fabricated considering mechanical and biological factors, full mouth rehabilitation can provide a long term success.

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